

WHAT IS CLAIMED IS:

1. A method for performing a procedure on a mitral valve of a heart, the method comprising:

5           inserting at least one implant into a left ventricle of the heart;  
positioning the at least one implant with respect to the mitral valve, wherein  
positioning the implant includes orienting the implant in the left ventricle  
substantially below the mitral valve; and  
attaching the implant to tissue located near the mitral valve.

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2. A method as recited in claim 1 further including:  
reducing an arc length of the implant, wherein reducing the arc length of the  
implant substantially reduces an arc length associated with the mitral valve.

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3. A method as recited in claim 1 wherein inserting the implant into the left  
ventricle includes:  
introducing the implant into an aorta; and  
passing the implant through an aortic valve interposed between the aorta and  
the left ventricle.

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4. A method as recited in claim 3 further including:  
introducing a guide element into the left ventricle, the guide element being  
configured to be positioned in the left ventricle between a plane of the mitral valve  
and a plane associated with papillary muscles of the heart, wherein inserting the  
25 implant into the left ventricle includes positioning the implant such that the implant  
uses the guide element as a track.

5. A method as recited in claim 4 further including:  
removing the guide element from the left ventricle after attaching the implant  
30 to the tissue.

6. A method as recited in claim 4 wherein introducing the guide element into the  
left ventricle includes:

introducing a first catheter assembly into the aorta, the first catheter assembly including an angled catheter, and a gutter catheter, wherein the angled catheter substantially carries the gutter catheter, the angled catheter being arranged to facilitate positioning of the gutter catheter;

5        positioning the gutter catheter beneath the mitral valve between the plane of the mitral valve and the plane associated with the papillary muscles, wherein positioning the gutter catheter includes positioning the gutter catheter along a wall of the left ventricle; and

      inserting the guide element into a lumen of the gutter catheter.

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7.        A method as recited in claim 6 wherein introducing the guide element into the left ventricle further includes:

      anchoring the guide element against the wall.

15      8.        A method as recited in claim 4 wherein attaching the implant to the tissue includes:

      introducing a catheter into the left ventricle using the guide element as a track, wherein the catheter includes at least one pointed wire, the pointed wire including a tip section, the pointed wire further being configured to carry a coupling element, the tip section being configured for insertion into the implant and the tissue;

20      pushing the tip section through the implant and the tissue, wherein pushing the tip section through the implant and the tissue positions at least a part of the coupling element on an atrial side of the tissue; and

      retracting the tip section from the implant and the tissue, wherein retracting the tip section causes the coupling element to substantially couple the implant with the tissue.

9.        A method as recited in claim 8 wherein the coupling element is a T-bar.

25      10.      A method as recited in claim 3 further including:

      introducing a guide element into the left ventricle, the guide element being configured to be positioned in the left ventricle in a region of the left ventricle substantially bounded by leaflets of the mitral valve, the papillary muscles of the

heart, a ventricular wall, and cordae tendonae, wherein inserting the implant into the left ventricle includes positioning the implant such that the implant uses the guide element as a track.

5 11. A method as recited in claim 1 further including:  
adjusting an arc length of the implant.

12. A method as recited in claim 1 wherein the tissue is fibrous tissue.

10 13. A method for performing annuloplasty on a mitral valve of a heart, the method comprising:

inserting a first catheter assembly into a left ventricle through an aorta of the heart and an aortic valve of the heart;

15 positioning a guide element along a wall of the left ventricle beneath the mitral valve using the first catheter assembly;

positioning at least one implant in the left ventricle beneath the mitral valve using the guide element as a guide; and

connecting the at least one implant to tissue near the mitral valve.

20 14. A method as recited in claim 13 wherein the implant includes a shortening means, and the method further includes:

shortening the implant using the shortening means, wherein shortening the implant substantially reduces an arc length of the mitral valve.

25 15. A method as recited in claim 13 wherein the first catheter assembly includes a first catheter and a second catheter, the second catheter being located at least partially within the first catheter, the first catheter being arranged to facilitate the positioning of the second catheter along the wall of the left ventricle, and wherein positioning the guide element along the wall includes:

30 inserting the guide element through the second catheter; and  
anchoring the guide element against the wall.

16. A method as recited in claim 15 further including:

removing the first catheter and the second catheter from the left ventricle; and inserting a third catheter into the left ventricle, the third catheter configured to carry the implant and to use the guide element as a guide.

5 17. A method as recited in claim 13 wherein connecting the implant to the tissue near the mitral valve includes:

inserting a fourth catheter into the left ventricle, the fourth catheter being configured to carry a first connection element; and

10 inserting the first connection element through the implant and the tissue such that the implant and the tissue are coupled by the first connection element.

18. A method as recited in claim 17 wherein the fourth catheter is further configured to carry a second connection element, the method further including:

15 inserting the second connection element through the implant and the tissue such that the implant and the tissue are coupled by the second connection element.

19. A method as recited in claim 17 wherein positioning the implant in the left ventricle beneath the mitral valve using the guide element further includes:

inserting at least one balloon into the left ventricle; and

20 inflating the balloon, wherein inflating the balloon positions the implant generally against the mitral valve.

20. A method as recited in claim 17 wherein positioning the implant in the left ventricle beneath the mitral valve using the guide element further includes:

25 inserting at least one expandable element into the left ventricle; and

expanding the expandable element, wherein expanding the expandable element positions the implant generally against the mitral valve.

21. A method for accessing a left ventricle of a heart, the method comprising

30 introducing an elongated body into an aorta of the heart;

passing at least a portion of the elongated body through an aortic valve positioned between the aorta and the left ventricle; and

positioning the portion of the elongated body in the left ventricle.

22. A method as recited in claim 21 wherein locating the portion of the elongated body in the left ventricle includes positioning the portion of the elongated body between a plane associated with a mitral valve of the heart and a plane associated with 5 papillary muscles of the left ventricle.

10 23. A method as recited in claim 22 wherein the elongated body is an implant, and locating the portion of the elongated body in the left ventricle further includes positioning the implant substantially against tissue near the mitral valve.

15 24. A method as recited in claim 22 wherein the elongated body is a catheter.

25. A method as recited in claim 24 wherein the catheter is arranged to provide at least one plication in the tissue near the mitral valve.

15 26. A method as recited in claim 21 wherein locating the portion of the elongated body in the left ventricle includes positioning the portion of the elongated body between a plane associated with a mitral valve of the heart, a plane associated with papillary muscles of the left ventricle, cordae tendonae of the left ventricle, and a wall 20 of the left ventricle.

25 27. A method as recited in claim 26 wherein the elongated body is an implant, and locating the portion of the elongated body in the left ventricle further includes positioning the implant substantially against tissue near the mitral valve.

25 28. A method as recited in claim 26 wherein the elongated body is a catheter.

29. A method as recited in claim 28 wherein the catheter is arranged to provide at least one plication in the tissue near the mitral valve.

30 30. A method as recited in claim 21 further including:  
introducing an expandable element into the aorta, wherein the expandable element is substantially unexpanded;

positioning the expandable element in the left ventricle; and  
expanding the expandable element, wherein expanding the expandable  
element causes the portion of the elongated body to contact a target region of the  
heart.

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31. A method as recited in claim 30 wherein the target region of the heart is tissue  
near the a mitral valve of the heart.

32. A method for performing annuloplasty, the method comprising:

10 accessing a left ventricle of a heart to provide an implant to the left ventricle;  
and

coupling the implant to tissue near a mitral valve of the heart, wherein the  
implant is coupled to a ventricular side of the mitral valve.

15 33. A method as recited in claim 32 further including:

shaping the implant, wherein shaping the implant substantially reduces an arc  
length associated with the mitral valve.

34. A method as recited in claim 33 wherein shaping the implant includes

20 substantially reducing an arc length of the implant by providing tension to the  
implant.

35. A method as recited in claim 32 wherein accessing the left ventricle includes  
inserting an elongated body into the left ventricle through an aorta and an aortic valve  
25 of the heart.

36. A method as recited in claim 35 wherein providing the elongated body into the  
left ventricle includes inserting the elongated body into the left ventricle between a  
plane associated with the mitral valve and a plane associated with papillary muscles  
30 of the heart.

37. A method as recited in claim 35 wherein providing the elongated body into the  
left ventricle includes inserting the elongated body into a region of the left ventricle

substantially defined between a plane associated with the mitral valve, a plane associated with papillary muscles of the heart, a wall of the left ventricle, and cordae tendonae of the heart.

5     38.    A device for use in an annuloplasty procedure, the device comprising:  
          a member, the member being arranged to be substantially shortened with  
          respect to itself when tension is applied to the member;  
          a mesh, the mesh being arranged over the member; and  
          a tensioning element, the tensioning element being configured to apply tension  
10    to the member, wherein when the device is coupled to tissue surrounding a mitral  
          valve of a heart, the tensioning element is configured to cause the device to reduce an  
          arc length associated with the mitral valve.

15    39.    A device according to claim 38 wherein the device is suitable for being  
          positioned on a ventricular side of the mitral valve.

40.    A device according to claim 39 wherein the tensioning element is  
          continuously adjustable to alter the tension applied to the member.

20    41.    A device according to claim 39 wherein the tensioning element is at least  
          partially located within the member.

42.    A device according to claim 39 further including:  
          a coupler, the coupler being arranged to extend through the member and the  
25    mesh, the coupler further being arranged to couple the device to the tissue.

43.    A device according to claim 42 wherein the coupler is a T-bar.

44.    A device for use in an annuloplasty procedure, the device comprising:  
30    a collapsible member, wherein the collapsible member is movable between an  
          extended position for insertion into a left ventricle through a catheter and a short  
          position; and

a shortening device, the shortening device being operable to move the compressible member between the extended position and the short position, wherein the device is positioned to reduce an opening of a mitral valve when the device is in the short position.

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45. A device according to claim 44 further including:

a mesh covering, the mesh covering extending over at least a portion of the compressible member.

10 46. A device according to claim 44 wherein the device is suitable for being coupled to tissue near the mitral valve.

47. A device according to claim 46 further including:

15 a coupler, the coupler being configured to extend through the structure and the mesh, the coupler further being arranged to couple the device to the tissue.

48. A system for performing annuloplasty on a mitral valve of a heart, the system comprising:

20 a catheter assembly configured for insertion through an aorta of the heart into a left ventricle of the heart to reach a region of the left ventricle substantially below the mitral valve;

a guide element shaped for insertion into the catheter assembly, the guide element having an anchorable feature; and

25 an implant, the implant being shaped for insertion over the guide element into the left ventricle substantially below the mitral valve, wherein the implant is configured to be connected to tissue of the heart.

49. A system according to claim 48 wherein the catheter assembly includes a delivery tube and a gutter catheter, the gutter catheter being positioned at least

30 partially within the delivery tube, wherein a portion of the gutter catheter is configured to be positioned substantially within a region of the left ventricle defined between a plane associated with the papillary muscles of the left ventricle and a plane associated with the mitral valve.

50. A system according to claim 49 wherein the guide element is shaped for insertion into a lumen of the gutter catheter.

5 51. A system according to claim 48 wherein the catheter assembly includes a delivery tube and a gutter catheter, the gutter catheter being positioned at least partially within the delivery tube, wherein a portion of the gutter catheter is configured to be positioned substantially within a region of the left ventricle defined between a plane associated with the papillary muscles of the left ventricle, a plane 10 associated with the mitral valve, cordae tendonae of the left ventricle, and a wall of the left ventricle.

15 52. A system according to claim 48 further including:  
a delivery catheter, the connection catheter configured to provide a connection element, wherein the connection element is configured to connect the implant to the tissue.

20 53. A system according to claim 52 wherein the tissue is located near the mitral valve.

55. A system according to claim 53 wherein the tissue is fibrous tissue.

25 56. A system according to claim 51 wherein the implant includes a shortening element, the shortening element being arranged to shorten an arc length associated with the implant, wherein shortening the arc length associated with the implant reduces an arc length associated with a posterior leaflet of the mitral valve.

30 57. A system according to claim 51 wherein the implant is configured to have a shortened state and an unshortened state, wherein when the implant is inserted over the guide element, the implant is in the unshortened state, and wherein when the arc length associated with the implant is shortened, the implant is in the shortened state.

58. A system according to claim 48 wherein the guide element is formed from one of a stainless steel material and a shape memory material.

59. A system according to claim 48 wherein the catheter assembly is at least partially formed from at least one of a nylon material and a urethane material.